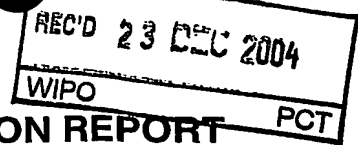


PATENT COOPERATION TREATY

PCT



INTERNATIONAL PRELIMINARY EXAMINATION REPORT  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference K0344PCT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/JP 03/09360	International filing date (day/month/year) 23.07.2003	Priority date (day/month/year) 14.08.2002
International Patent Classification (IPC) or both national classification and IPC B60C23/04		
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 14 sheets.

## 3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  23.06.2004	Date of completion of this report  22.12.2004
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Billen, K  Telephone No. +49 89 2399-7020 

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/JP 03/09360

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, Pages

1-105 as originally filed

### Claims, Pages

110-113, 115-117 as originally filed  
106, 106A, 107, 108, 108A, received on 25.11.2004 with letter of 22.10.2004  
109, 109A, 114, 118, 119, 120,  
120A, 121, 122

### Drawings, Sheets

1/29-29/29 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/JP 03/09360**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**IV. Lack of unity of invention**

1. In response to the invitation to restrict or pay additional fees, the applicant has:

- ☐ restricted the claims.  
☒ paid additional fees.  
☐ paid additional fees under protest.  
☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.  
☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.  
☐ the parts relating to claims Nos. .

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	2-38, 42-48
	No: Claims	1, 39, 41
Inventive step (IS)	Yes: Claims	36, 37, 38
	No: Claims	1-35, 39-48
Industrial applicability (IA)	Yes: Claims	1-48
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/JP 03/09360

**Re Item IV**

**Lack of unity of invention**

The subject-matter of independent claims 1, 39 and 41 is already known (see Re Item V.2).

The requisite unity of invention (Rule 13.1 PCT) therefore no longer exists inasmuch as a technical relationship involving one or more of the same or corresponding special technical features in the sense of Rule 13.2 PCT does not exist between the subject-matter of the following groups of dependent claims:

**1. Claims: 1-35, 39-46**

Tyre air pressure is estimated by using wheel speed sensors  
in case of a failing wheel mounted pressure sensor

**2. Claim : 36 37**

Tyre temperature is estimated by using a vehicle load  
detecting device, a vehicle running state detecting device  
and an ambient-temperature detecting device in case of a  
failing wheel mounted temperature sensor

**3. Claim : 38**

Force acting on wheel is estimated by using driving state  
detecting device, braking state detecting device and turning  
state detecting device in case of a failing wheel mounted  
force sensor

**4. Claims: 47, 48**

An actuator portion (air-pressure adjusting apparatus or  
suspension control) is controlled on the basis of a wheel  
status (tyre air pressure)

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/JP 03/09360

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**V.1 Prior Art**

Reference is made to the following documents:

D1: EP1044829 A  
D2: DE19951273A  
D3: US2002/0044050A  
D4: US-A-5 827 957  
D5: DE10029282  
D6: WO10029282

**V.2 Independent Claims 1, 39, 41 (first group of claims)**

The application does not meet the requirements of the PCT because the subject-matter of claim 1 is not new (Article 33(2) PCT).

D1 discloses a wheel-state obtaining apparatus comprising:  
a wheel-side device (4a-4d) provided for each of at least one of a plurality of wheels (2a-2d) of a vehicle and including a first-wheel-state detecting device (4a-4d; p. 5, lines 3-19) operable to detect a first state of the corresponding wheel; and a body-side device (10) disposed on a body of the vehicle and including  
(a) a detected-information obtaining device (p. 5, lines 10-19) operable to obtain detected information representative of the first state of said corresponding wheel detected by said first-wheel-state detecting device (4a-4d),  
(b) a vehicle-state detecting device (12a-12d) operable to detect a state of the vehicle,  
(c) an estimated-information obtaining device (10) operable to estimate said first state of said corresponding wheel on the basis of at least the state of the vehicle detected by said vehicle-state detecting device (12a-12d), and obtain estimated information representative of the estimated first state (p.5, lines 28-34; p. 6, line 50 - p. 7, line 56), and  
(d) a determining device (10) operable to determine one of said detected information and said estimated information, as wheel-state information

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/JP 03/09360

representative of said first state of said corresponding wheel (p.7, line 56 - p.8, l. 54; claims 1,4),  
and wherein said estimated-information obtaining device (10) is operable to obtain said estimated information, during a periode between adjacent moments of reception by said body-side device (6,10) of wheel-side information ( $P_1$ - $P_4$ ) representative of said first state of said corresponding wheel detected by said first-wheel-state detecting device (4a-4d), said determining device (10) including a first determining portion operable to determine, as said wheel-state information, said estimated information obtained during said period (paragraph 27-29).

Further D1 disclosed all additional technical features of claims 39 and 41:

- claim 39 : see p. 5, lines 3-9;
- claim 41 : see Fig. 1, "Übertragungsweg" (14a-14d).

Accordingly, the subject-matter of claims 1, 39 and 41 lacks novelty.

### **V.2.1 Dependent Claims**

The dependent claims 2-35, 42-46 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to novelty and inventive step (Articles 33(2, 3) PCT).

These claims suggest a slight constructional change in the design of the wheel-state obtaining apparatus which - considering the disclosure of D1, D2 and D3 - comes within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can be readily contemplated in advance. Consequently, the subject-matter of the dependent claims also appears to lack novelty or inventive step, respectively.

### **V.3 Dependent Claims 36 and 37 (second group of claims)**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/JP 03/09360

The document D4 is regarded as being the closest prior art to the subject-matter of claims 36 and 37 which differs from the wheel-state obtaining apparatus of D4 by an estimated-temperature-state-information obtaining portion to estimate tire temperature on basis of vehicle body positioned sensors, e.g. cumulative running time sensor or load detecting sensor.

The subject-matter of claims 36 and 37 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as providing a redundant tire temperature sensing in case the tire mounted sensor module fails.

The solution to this problem proposed in claims 36 and 37 of the present application is considered as involving an inventive step (Article 33(3) PCT).

**V.4 Dependent Claim 38 (third group of claims)**

The document D4 is regarded as being the closest prior art to the subject-matter of claim 38 which differs from the wheel-state obtaining apparatus of D4 by an estimated force-information obtaining portion to estimate force acting on each wheel on basis of vehicle body positioned sensors, e.g. acceleration, braking turning state sensors.

The subject-matter of claim 38 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as providing a redundant wheel force sensing in case the wheel mounted force sensor fails.

The solution to this problem proposed in claim 38 of the present application is considered as involving an inventive step (Article 33(3) PCT).

**V.5 Dependent Claims 47 and 48 (fourth group of claims)**

The dependent claims 47-48 do not appear to contain any additional features

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/JP 03/09360

which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to novelty and inventive step (Articles 33(2, 3) PCT.

Document D5 shows an actuator portion and actuator control portion (col. 4, lines 43-49) operable to control an "ABS" or "ESP" on the bases of the tire pressure.

In addition document D6 discloses on page 6, lines 4-9 the same technical features.

**V.6 Industrial Applicability**

The subject-matter of claims 1-48 seems to fulfil the requirement of Article 33(4) PCT since it can be used at least in the automotive industry.